ORTEC Technical Workshop for Monday, Oct. 24, 2005

8:30 Welcome - Doug Van Cleef - Manager,ORTEC Distribution and Technical Support, Americas and Benson Davis- Systems Sales and Technical Support, Advanced Measurement Technology - ORTEC

8:45 "Basic Physics for Alpha and Gamma Spectroscopy", Doug Van Cleef, Manager ORTEC Distribution and Technical Support, Americas
This introduction includes a review of the nature and origins of gamma and alpha radiation as well as basic physics of interaction with matter.

9:45 "Fundamentals of Alpha Spectroscopy", Craig Maddigan, Application Specialist, Advances Measurement Technology, ORTEC
2005-00-044* Fundamentals of Alpha Spectroscopy (2 hours)
This course offers a fast-paced review of the basic principles of alpha spectroscopic analysis. The course includes a review of the considerations and consequences of sample preparation for alpha spectroscopy, alpha spectroscopy system components and calibrations, and a primer on interpretation of alpha spectroscopy data. This course is two hours in duration (when combined with the Basic Physics course above) and the American Academy of Health Physics will grant 4 continuing education credits for completion.

10:45 Break

11:00 "Fundamentals of Gamma Spectroscopy", Benson Davis - Technical Support and Systems Sales Support Advances Measurement Technology - ORTEC.
2005-00-043* Fundamentals of Gamma Spectroscopy (2 hours)
This course offers a fast-paced review of the basic principles of gamma spectroscopic analysis. The course includes a review of the nature and origins of gamma-emitting radioactivity, basic physics of gamma interaction with matter, consequences of gamma interactions on gamma spectra, gamma spectroscopy system components and calibrations, gamma spectroscopy analysis methods and interpretation of gamma spectroscopy data. The course is two hours in duration (when combined with the Basic Physics course above) and the American Academy of Health Physics will grant 4 Continuing Education Credits for completion.

12:00 Lunch

1:15 - 2:00 1st User Presentation (Gary Kramer - Health Canada). Human Monitoring Laboratory

2:00 - 2:45 2nd User Presentation (Henrieta Dulaiova - Environmental
Radioactivity Measurement Facility, Florida State University) - The advantage of the use of low background gammaspectrometry for counting 226Ra and 228Ra in natural water samples.
Abstract: One of the methods that we use for analysis of radium in natural waters is by preconcentration via adsorption onto MnO2-coated acrylic fiber. The fiber containing radium is ashed and sealed into a crucible which is counted by gamma-spectrometry. 228Ra is determined by 228Ac (338 and 911 keV), 226Ra is determined either by its direct photopeak at 186 keV

(clear from interferences from 235U) or by counting 214Bi (609 keV) and 214Pb (295 and 351 keV). It is important to use a low background counting system since radionuclides from building structures and primordial emitters from the cryostat may contribute significantly to the backgrounds of the peaks of interest.

The gamma-spectrometry system in our facility at FSU consists of a GMX series detector (16.4 % at 1332 keV), housed in a 4" Pb shielding with 0.02"Cd and 0.06" Cu liners in the cavity. The full-energy peak backgrounds measured with blank fiber were 0.10 cpm at 295 keV, and 0.14 cpm at 609 keV. The calculated MDA for 226Ra for a 20-liter water sample and 2 days of counting is 0.7 dpm L-1 via the 186 keV peak, ~0.23 dpm L-1 (295, 352, 609 keV), and ~0.22 dpm L-1 for 228Ra.
A set of radium fibers was counted on Ortec's low background gamma-spectrometric system. The system consists of a GEM FX (47.3% at 1332 keV) series detector in a Pop-Top capsule configuration. The shielding has 2-6" Pb walls, 0.06" Sn and 0.25" Cu lining, with additional low background shielding in the capsule. The backgrounds of the blank fiber were 0.006 cpm at 295 keV, and 0.008 cpm at 609 keV. The lower background and higher efficiency of this detector provided a much lower MDA than the FSU system. This allowed us to reach the same MDA in only5-6 hours. The low background system was much more effective due to a better sample/detector geometry, higher efficiency, but mainly because of almost two orders of magnitude lower backgrounds. This improvement allowed us to count 50 samples in only 25 days rather than the ~75 days on our own system.

2:45 - 3:00 Break

3:00 - 3:45 3rd User Presentation (Don Dry - LANL) - LANL's Experience with AlphaVision
3:45 - 4:30 4th User Presentation (Jennifer Hartel - CDC) - "Incorporating a Radionuclide laboratory into an inorganic laboratory; trials and tribulations"
Abstract: For over 30 years our laboratory has focused on the periodic table for analytes of interest to pursue for public health applications. Recently under the directive of the Federal Response Plan - Emergency Support Function (ESF) #8, our role at the Centers for Disease Control and Prevention is to rapidly evaluate human exposure to a radiological event. Currently we our focusing our efforts on developing a rapid gamma spectrometry method for detection of various nuclides.
4:30 Questions / Discussions